Site Need Statement

General Reference Information	
1 *	***Need Title*:** Melter Disassembly and Disposal
2 *	***Need Code:*** RL-WT119
3 *	***Need Summary*:** Methods to decommission a High Level Waste (HLW) melter at end of life and to change out individual melter system components during hot operations are needed.
4 *	***Origination Date*:** FY2002 (October 18, 2001)
5 *	***Need Type*:** Technology
6	***Operation Office*:** Office of River Protection (ORP)
7	***Geographic Site Name*:** Hanford Site
8 *	***Project*:** Waste Treatment and Immobilization Plant PBS No: RL-TW06
9 *	***National Priority:*** ____1. High - Critical to the success of the EM program, and a solution is required to achieve the current planned cost and schedule. _X_2. Medium - Provides substantial benefit to EM program projects (e.g., moderate to high life-cycle cost savings or risk reduction, increased likelihood of compliance, increased assurance to avoid schedule delays). ____3. Low - Provides opportunities for significant, but lower cost savings or risk reduction, may reduce the uncertainty in EM program project success.
10	***Operations Office Priority*:**
Problem Description Information	
11	***Operations Office Program Description*:** To perform the activities necessary to remediate the Hanford tank waste, DOE assigned responsibility to the Office of River Protection (ORP) in Richland, Washington. DOE has extended a contract for the design, construction, and commissioning of a new Waste Treatment and Immobilization Plant (WTP) that will treat and immobilize the waste for ultimate disposal. The WTP is comprised of four major elements, pretreatment, LAW immobilization, HLW immobilization, and balance of plant facilities.
12	***Need/Problem Description*:** WTP currently does not have the capability to decommission, size reduce, decontaminate, classify and dispose of failed, highly contaminated processing equipment. This includes failed high level waste glass melters, process vessels and process equipment. A single failed glass melter, for example, could contain as much HLW glass as five canisters. It will contain additional contamination in the form of unmelted waste solids and as volatile cesium. It is unacceptable to place this "waste form" in relatively uncontrolled long term storage and to continue to add more of the same and other equipment. While failed HLW Glass melters are prime examples to demonstrate this need, it also applies to other equipment such as failed jumpers, off-gas system components, process tanks, equipment, pumps and others. The radioactive properties of the feed stream as well as the glass product stream will require component change out / melter decommissioning to be done remotely. Life expectancies for melter system components (i.e. feed system, refractory, electrodes, thermowells offgas system) need to be established through corrosion and erosion testing. A melter system design needs to be developed that incorporates remote melter component decontamination and change out capabilities. An evaluation of available radioactive melter system decontamination technology with respect to component change out and decommissioning should be completed and applied where possible.
13	***Functional Performance Requirements*:** Equipment must ultimately be capable of remote handling, dismantling and size reduction of equipment occupying WTP melt cell. The facility must be capable of dismantling, cutting, size reduction, decontamination, and classification of various materials including: metal alloys, plastic and elastomeric materials, electrical motors/equipment, refractory and ceramic

	materials, glass blocks, other miscellaneous materials. Facility equipment must be remotely replaceable and must be capable of operation in a high radiation field.
	Schedule Requirements:
14	***Definition of Solution*****:**
15 *	***Targeted Focus Area*****:** Tank Focus Area
16	***Potential Benefits*****: :** The major benefit is to ensure that the WTP starts up and operates according to plan and schedule: processing the various wastes in the quantities expected.
17 *	***Potential Cost Savings*****:** $
18 *	***Potential Cost Savings Narrative*****:** The ability to cost-effectively perform remote change-out of components and decommissioning of those parts will reduce secondary waste generation and down-time, providing significant life-cycle cost savings for operating the vitrification facility**.**
19	***Cultural/Stakeholder Basis*****:** The River Protection Project is committed to moving forward to design, construct, and put into operation the Waste Treatment and Immobilization Plant on the schedule agreed to in the Tri-Party Agreement. A robust program is necessary to ensure that delays, all of which are costly, are minimized. A key part of this risk mitigation is to include in the total program a capability to test with actual wastes the processes and equipment planned, or later in use.
	Technical Basis: To date, no radioactively contaminated full scale joule heated melters have been decommissioned in the DOE system. This technology must be developed. High Level Waste (HAW) melter operation and maintenance experience and lessons learned from operating sites may be applicable.
20	***Environment, Safety, and Health Basis*****:** Although adequate for short term storage with routine surveillance, long term storage of contaminated high level waste equipment poses a high risk of spread of contamination to the environment.
21	***Regulatory Drivers*****:** Environmental Impact Statement (EIS) for the Tank Waste Remediation System (TWRS) (DOE-RL and Ecology 1996) and the Hanford Federal Facility Agreement and Consent Order (known as the Tri-Party Agreement) and its amendments. DOE has negotiated additions to the Tri-Party Agreement that require the retrieval of single shell tanks by 2018, and the startup and operation of the WTP to support the treatment and immobilization of tank waste. By operating the WTP not only is that capability demonstrated and about 10% by volume (25% by activity) of the tank waste processed, but space is made available in the double shell tanks to allow the single shell tank retrieval to proceed without the expenditure of vast sums for additional double shell tanks. Other regulatory drivers include gathering the data necessary for the regulatory permits required for the startup and operation of the facility.
22 *	***Milestones*****:** November 15, 1999 tri-party agreement on principal regulatory commitments: • Start (Hot) commissioning-Phase I Treatment Complex 12/2007 • Start Operation-Phase 1 Treatment Complex 12/2009 • Complete Phase I-Treatment (no less than 10% of the tank waste by volume and 25% of the tank waste by activity) 12/2018 Other selected TPA milestones are: • Retrieve all SSTs 2018 • Close SSTs 2024 • Immobilize remaining tank waste 2028 • Close all tanks 2032
23 *	***Material Streams*****:** Hanford High-Level Defense Waste. The River Protection Project (formerly known as the Tank Waste Remediation System) involves PBSs RL TW-01 through TW-09. The technical, work scope definition, and intersite dependency risks for Phase 1 Waste Treatment and Immobilization is respectively, 3,3,3 on a scale of 1 to 5 where "5" represents high programmatic risk. This stream is on the critical closure path for Hanford Site cleanup.
24	***TSD System*****:** Input not required.
25	***Major Contaminants*****:** Fission products, actinides, and nitrate.

27	***Contaminated Media*:** Tank waste consisting of supernate (liquid), salt cake, and sludge.
28	***Volume/Size of Contaminated Media*:** The Hanford Site has 177 underground tanks that store 204 million liters (54 M gallons) of waste containing about 190 MCi of activity.
29 *	***Earliest Date Required*:** 11/2002 The earliest date required is in support of WTP permitting.
30 *	***Latest Date Required*:** 10/2007 To support Phase 2 operations a FY 2008 completion date will be required.
Baseline Technology Information	
30	***Baseline Technology(ies)/Process*:** The current baseline approach to dealing with this equipment is long term storage in the canyon facilities. Technology Insertion Point(s): (as applicable)
31	***Life-Cycle Cost Using Baseline*:**
32	***Uncertainty on Baseline Life-Cycle Cost*:**
33	***Completion Date Using Baseline:***
Points of Contact (POC)	
34	***Contractor End User POCs*:** Paul Rutland, River Protection Project – Waste Treatment Plant, Process Technology Flowsheet, P/509-371-5213; F/509-371-5163; email: plrutlan@bechtel.com Steve Barnes, River Protection Project – Waste Treatment Plant, Research and Technology – Vitrification Technology, P/509-371-5127, F/509-371-5163, email: smbarnes@bechtel.com
35	***DOE End User POCs*:** R. (Rudy) Carreon, DOE Office of River Protection Project Requirements Division, 509-373-7771, F/509-373-0628, email: Rodolfo_Rudy_Carreon@rl.gov B.M. (Billie) Mauss, DOE Office of River Protection Program Office, 509-373-9876, F/509-372-2781, email: Billie_M_Mauss@rl.gov E.J. (Joe) Cruz, DOE Office of River Protection Project Requirements Division, 509-372-2606, F/509-373-1313, email: E_J_Cruz@rl.gov
36 *	***Other Contacts:***

*Element of a Site Need Statement appearing in IPABS-IS